Citation:

Rosell M, Håkansson NN, Wolk A. Association between dairy food consumption and weight change over 9 y in 19,352 perimenopausal women. *Am J Clin Nutr.* 2006 Dec;84(6):1481-8.

PubMed ID: 17158433

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine the association between changes in dairy product consumption and weight change over 9 years.

Inclusion Criteria:

- Participants of the Swedish Mammography Cohort
- Swedish women aged 40 - 55 years at baseline

Exclusion Criteria:

- Died
- Permanently moved out of the study area
- Incorrect or missing identification number on the questionnaire
- Data on body weight or height were missing at baseline or follow-up
- Had suffered from cancer, cardiovascular disease (angina, coronary disease, and stroke) or diabetes before 1997
- Mean change in BMI between baseline and follow-up was >2 units per year

Description of Study Protocol:

Recruitment

- Analyses based on data from Swedish Mammography Cohort.
- In 1987 - 1990, all women born between 1914 - 1948 living in the counties of Vastmanland and Uppsala in central Sweden were invited to participate in a mammography screening program.
- 66,651 of the invited women (74%) completed a questionnaire on anthropometric measures, dietary intake, education and parity

- 56,030 remained in the cohort in 1997 and they received an extended follow-up questionnaire

Design: Prospective cohort study

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- For each of the five types of dairy product variables, the associations between the change in intake and a mean weight gain of >1 kg/year were calculated as age-adjusted odds ratios by using multivariable logistic regression analyses, with group 1 as the reference
- To evaluate whether there was an effect modification by BMI, interactions between dairy foods and BMI were tested
- Stratified analyses were performed for normal weight and overweight at baseline, because all interaction terms were significant
- Multivariate regression analyses using change in body weight as a continuous outcome were also performed

Data Collection Summary:

Timing of Measurements

- Data on dietary intake, body weight, height, age, education and parity were collected in 1987-1990 and 1997.
- Intake frequencies of dairy foods calculated at baseline and follow-up

Dependent Variables

- Weight based on self-report

Independent Variables

- Dairy food consumption: whole milk and sour milk (3% fat), medium-fat milk (1.5%), low-fat milk and sour milk (<0.5% fat), cheese and butter
- In 1987, dietary intake measured with 67-item food frequency questionnaire
- In 1997, dietary intake measured with extended 96-item food frequency questionnaire
- Women categorized into 4 groups according to intake: 1) constant, <1 serving per day; 2) increased from <1 to >1 serving per day, 3) constant, >1 serving per day, or 4) decreased from >1 to <1 serving per day

Control Variables

- Height and weight at baseline
- Education
- Parity
- Intakes of energy, protein, fat, carbohydrates, fiber and alcohol at baseline
- Changes in these intakes during follow-up
- Smoking
- Physical activity

Description of Actual Data Sample:

Initial N: 56,030 remained in the cohort in 1997, ~70% completed the follow-up questionnaire, leaving an identifiable cohort of 38,984 women.

Attrition (final N): 19,352 women included in the analyses

Age: aged 40 - 55 years at baseline, mean 46.3 ± 4.5 years at baseline

Ethnicity: not reported

Other relevant demographics:

Anthropometrics

- Mean BMI at baseline was 23.7 ± 3.5 kg/m^2

Location: Sweden

Summary of Results:

Key Findings

- Mean BMI at baseline was 23.7 ± 3.5 kg/m^2
- The mean weight gain in the whole cohort was 0.33 ± 0.63 kg/year
- The constant (>1 serving/day) intakes of whole milk and sour milk and of cheese were inversely associated with weight gain; odds ratios for group 3 were 0.85 (95% confidence interval: 0.73 - 0.99) and 0.70 (95% confidence interval: 0.59 - 0.84), respectively.
- No significant associations were seen for the other three intake groups.
- When stratified by BMI, the findings remained significant for cheese, and for normal-weight women only, for whole milk and sour milk.

Author Conclusion:

In conclusion, the association between the intake of dairy products and weight gain differed according to the type of dairy product and according to the body weight status at baseline. Further studies are needed to elucidate the effects of different types of dairy products and the linkage between the consumption of dairy products and other dietary and lifestyle factors.

Reviewer Comments:

Weight based on self-report. Authors note the following limitations:

- *Unable to adjust for changes in smoking or physical activity during follow-up*
- *Validity of the dietary data*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	???
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	???
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	???
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	???
7.6.	Were other factors accounted for (measured) that could affect outcomes?	???
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes

	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes